NAME	Year of Publication	AUTHOR	Publication Info	Description	Website Address	Need to Acquire	Info on website?	Index	Data Format	Chapter Key	Legend	version 1.8
EPA Storet Data Warehouse	2008	US EPA	Environmental Protection Agency Ariel Rios Building 1200 Pennsylvania Avenue, N.W. Washington, DC 20460 (202) 272-0167	Online database for US watershed info water quality, habitat and biological results.	http://www.epa.gov/storet/dw_home.html	No	No	water quality, biological and habitat data	Online te:	7	Yellow = Acquisition in progress	
AB3030 Groundwater Management Plan Madera County Final Draft	January 2002	Todd Engineers		In this AB3030 plan, the County desires to: study the current conditions of the groundwater basins, document current groundwater management practices, and explore techniques to cooperatively manage one of the County's most important resources.	http://www.madera-county.com/rma/archives/uploads/1157731120_Document_upload_ab3030plan.pdf	Yes	No	groundwater	PDF	2	Pink = Acquisition in progress	
Ahwahnee/Nipinnawasee Area Plan	1999	USFS	Rocky Mtn Research Station USFS	Cumulative Watershed Effects of Fuel Management	http://forest.moscowfsl.wsu.edu/engr/cwe/	Yes, individual documents and reports	No	Fire, fuels, vegetation management	PDF	9	Green = Provided by Sarah Rutherford	
California Water Plan Update 2009, Volume 3, Regional Reports - Chapter 13 Mountain	2008	CA DWR	working draft 9/8/2008	Has chapters including: land use, water use, water supplies, water quality, flood management, regional water planning and management.	http://www.waterplan.water.ca.gov/regions/mc/	Yes, individual chapters	No	water quality	PDF	7	Turquoise = Recent Additions or addded info	
California Water Plan Update 2009, Volume 3, Regional Reports - Chapter 7 San Joaquin River Hydrologic Region,	2008	CA DWR	working draft 9/4/2008	More specific to the San Joaquin hydrologic area including: land use, water use, water supplies, water quality, flood management, regional water planning and management.	http://www.waterplan.water.ca.gov/regions/sjr/	No	No	water quality	PDF	7		
California Watershed Assessment Manual: Volume I	2005	F. Shilling, S. Sommarstrom, R. Kattelmann, B. Washburn, J. Florsheim, R. Henly.	Prepared for the California Resources Agency and the California Bay-Delta Authority	This manual is intended to provide guidance for planning and conducting watershed assessments for wildland and rural areas of northern and central California. Volume I of the Manual currently contains 8 chapters. These flow from the introductory chapter (1), through chapters describing the details of assessment planning (2), fundamentals of watershed functioning (3), data collection (4), data analysis (5), and data integration (6). Chapter 7 gives details on how to structure an assessment report; and chapter 8 describes connecting the	http://www.cwam.ucdavis.edu/Manual_chapters.htm	No	No	health indicator assessing	PDF & W	12		
California Watershed Assessment Manual: Volume II	2008 + drafting	F. Shilling, et. al.		Volume II of the CWAM provides guidance on specific aspects of watershed assessment and evaluation, including water quality, benthic macroinvertebrates, and fire ecology. Each chapter describes current methods to monitor and evaluate conditions of these watershed processes and features. They also include descriptions of how you can include the data collected about these watershed attributes in	http://cwam.ucdavis.edu/Volume_2/TOC.htm	No	No	BMI, biological monitoring, water quality, fires	PDF & W	7, 9		
California's San Joaquin Valley: A Region in Transition.	Dec 2005	Tadlock Cowen	CRS Report for Congress	Mostly reports on socioeconomic conditions of region, but does provide some analysis of water supply, water quality, and air quality issues, particularly as they relate to agriculture.	http://www.scribd.com/doc/322290/crs-san-joaquin-valley-report	Yes	No	water quality, water supply, agriculture	PDF	7, 8		
Coursegold Area Plan	2006	Mark H. Eisenbies	USFS Technical Report	Bibliography of Forest Water Yields, Flooding Issues, and the Hydrologic Modeling of Extreme	N/A	No	No	water supply	PDF	7		

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E-4 Population Estimates of Cities, Counties and the State, 2001-2008 with 2000	2008	State of California, Department of Finance	Department of Finance 915 L Street Sacramento, CA 95814	This report provides population estimates for January 1, 2001 through January 1, 2007 and provisional population estimates for January 1, 2008 for the state, counties and cities. The population estimates benchmark for April 1,	excel file; available at: http://www.dof.ca.gov/research/demographic/reports/estimates/e-4_2001-07/	Yes	No	population estimates	Excel	8			
Eastern Madera County and Mariposa County Long Term Plan for Watershed	2007	Sarah Marvin	Dept. of Environmental Science, UC Berkeley	Possible Changes in Water Yields and Peak Flows in Response to Forest Management	N/A	No	No	water supply	PDF	7			
Eastern Madera County Coarsegold Resource Conservation District Voluntary Water Quality, Grazing Land, Oak Woodland Conservation Management Guidelines	Sept 26, 1996	Coarsegold Resource Conservation District, North Fork, CA		These Conservation Guidelines are designed to address the nonpoint source water pollution as identified in the 1972 Clean Water Act, as amended, on the private grazing lands and oak woodlands of Madera County. They integrate Best Management Practices (BMP); agronomic, forestry, wildlife, ecology, and economic principals; to protect, enhance, and manage the beneficial uses of the waters, and associated riparian area, of the County, while protecting the agriculture and forestry enterprises. They provide for cost-share conservation programs under the USDA 1996 Farm Bill to strengthen the land stewardship partnership between landowners, agencies, and groups, while protecting private property rights. The County Oak Woodland Guidelines are incorporated to	Electronic: on line at http://www.crcd.org/pdf-wtrfinal.pdf	No	No	agriculture, water quality, conservation guidelines	PDF	7, 8			
Final Environmental Impact Report for the Hillview OSL Water System Improvement Project; Hillview Water Company, Inc.	December 2004	Valley Planning Consultants, Inc.	Prepared for the California Dept of Health Services, SCH#2000072011	This EIR was prepared for a project in Oakhurst, Madera County. It does not contain the full text from the June 2004 Draft EIR, but only a few pages of revisions to the Draft EIR, plus comments and responses. It contains several letters from agencies related to the California Red-legged Frog and the Valley Elderberry Longhorn Beetle. One of the Appendices is a report titled: "The Status of the California Red-Legged Frog in the Vicinity of the Hillview Water Company Water System		No	No	wildlife, CRLF, VELB	PDF	4			
Fresno River Landscape Analysis	July 2005	Sierra National Forest Bass Lake Ranger District		Has chapters on: ecosystem elements and environmental indicators, reference variability, existing conditions, desired conditions, management opportunities.		No	No	existing conditions, water quality, BMI, wildlife, fire, vegetation		7, 4, 9			

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The Montreal Process	1994	Various Countries	http://www.rinya.maff.go.jp/mpci/meetings_e.html	The Montréal Process is the Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests. It was formed in Geneva, Switzerland, in June 1994 to develop and implement internationally agreed criteria and indicators for the conservation and sustainable management of temperate and boreal forests.	http://www.rinya.maff.go.jp/mpci/whatis_e.html	No	No	forestry, vegetation management, sustainable development of forests, health assessment indicators	Html	8, 9		
Biological Assessment & Criteria		Wayne S. Davis & Thomas P. Simon	Available in Carolyn Hunsaker library, Lewis Publishers	Various articles in the area of conceptual framework for biocriteria development, water resource planning and decision-making, methods advancement and technical applications, and policy and perspectives.		No	No	health indicator assessing	Book	1		
Geology, Hydrology and Quality of Water in the Madera Area, San Joaquin Valley, CA.	1970	Kenneth Schmidt	Kenneth D. Schmidt and Associates	Expert Report of Kenneth D. Schmidt on potential impacts of reduced friant water deliveries on groundwater	http://www.restoresjr.net/program_library/05-Pre-Settlement/Expert%20Reports/Friant%20Water%20Users%20Authority%20Expert%20Reports/Schmid_Expert%20Report.pdf	No	No	groundwater	PDF	2		
Groundwater Conditions Eastern Madera County, Draft Technical	March 2002	Gordon E. Grant, et al.	May 2008 USFS Pacifc NW Station	Effects of Forest Practices on Peak Flows and Consequent Channel Response: A state of science report for western oregon and washington	N/A	No	No	water supply	PDF	7		
Groundwater Conditions in the Oakhurst Basin. AB 303 Study	November 2005	EPA Science Advisory Board	EPA Science Advisory Board 1400A Washington, DC	A Framework for Assessing and Reporting on Ecological Condition: An SAB Report	http://www.epa.gov/sab/pdf/epec02009.pdf	No	No	health indicator assessing	PDF	12		
Groundwater Quality Data in the Central Sierra Study Unit, 2006 - Results from the California GAMA Program	2006	U.S. Geological Survey	Data Series 335, US Dept of Interior, US Geological Survey in cooperation with State Water Resources Control Board	Describes methods and presents results of groundwater quality studies.	Electronic - on line at http://pubs.usgs.gov/ds/335/pdf/ds335.pdf	Yes	No	groundwater	PDF	2		
Applying Landscape Ecology in Biological Conservation		Kevin J. Gutzwiller, ed.	Available in Carolyn Hunsaker library; Publisher: Springer	Various articles with sections on multiple scales, connectivity, and organism movement; landscape change; conservation planning. "Aquatic conservation Planning: Using Landscape Maps to Predict Ecological			No	health indicator assessing	Book	1		
Madera Area Investigation	August 1966	California Department of Water Resources	Bulletin 35, Preliminary Edition	This investigation was conducted between March 1961 and June 1965 to determine water supply available to the Madera Area, to determine the water requirements for continued development of the area, and to plan for the optimum development of all local supplies for maximum beneficial use. The investigation concluded that additional water would have to be imported to ensure continued economic	http://www.worldcat.org/oclc/9588557?tab=holdings#tabs	?	No	Hydrology, Water Supply, Water Quality	Book, Bulletin			

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Madera County Community Wildfire Protection Plan	2008	Madera County Resource Management Agency		Summarizes planning process. Describes environmental conditions, infrastructure, and population in the planning area. Summarizes fire policy, trends, and risk as well as existing mitigation standards. Presents community wildfire risk assessment and offers mitigation actions for communities at risk. Contains section on education and outreach, and funding	pdf; available at: http://www.madera-county.com/rma/archives/uploads/1210692996_Document_upload_mccwpp42808fulldocument.pdf	Yes	No	vegetation management, fuels, fire	PDF	9		
Madera County General Plan. Policy Document and Background Report	1995	Madera County		Planning document with section called Agriculture and Natural Resources that contains info on forest resources, water resources, riparian habitat, fish and wildlife habitat, vegetation, etc.	pdf, available at: http://www.madera-county.com/rma/archives/uploads/1128960251_Document_gppolicy.pdf	Yes	No	Agriculture, wildlife, forest resources	PDF	8, 4		
Madera County Integrated Regional Water Management Plan, Volume 1	2008	Boyle Engineering in association with Kenneth D. Schmidt and Associates		Major topics are: water demand, water supply, water quality, flood control, water resources management opportunities, watershed management	pdf, available at http://www.madera-county.com/supervisors/water-plan.html	Yes	No	vegetation management, septic systems, water supply	PDF	7, 9, 8		
Madera County Integrated Regional Water Management Plan, Volume 2 - Appendices	2008	Boyle Engineering in association with Kenneth D. Schmidt		Reports of Groundwater Studies: Oakhurst AB 303 Study: pg 7-99; Coarsegold groundwater study: pg 560 - 640; Raymond/Daulton Ranch groundwater study: pg 850 - 896. Proposed Groundwater Monitoring Plan for Madera County: pgs 1075-1109	pdf, available at http://www.madera-county.com/supervisors/water-plan.html	Yes	No	groundwater	PDF	2		
Madera County Regional Transportation Plan	2007	Madera County Transportatio	Adopted May 23, 2007	Regional transportation plan.	Electronic - on line at http://www.maderactc.org/public.html	Yes	No	transportation		8		
Malibu Creek Watershed Monitoring Program, Bioassessment Monitoring, Spring / Fall 2005	June 2006	CA DWR	CalEPA Resources Agency	The California Watershed Management Strategic Action Plan calls for state watershed programs to "evaluate the utility of existing watershed related indicators for assessing watershed conditions and trends, and the use of performance measures for assessing watershed	http://www.watershedrestoration.water.ca.gov/watersheds/framework.cfm	No	No	health indicator assessing	Word	12		
US EPA Upper San Joaquin Watershed -- 18040006	2008	US EPA	Environmental Protection Agency Ariel Rios Building 1200 Pennsylvania Avenue, N.W. Washington, DC 20460 (202) 272-0167	EPA Surf your Watershed - upper san joaquin watershed profile	http://cfpub.epa.gov/surf/huc.cfm?huc_code=18040006	No	No	water quality, water data, water use		7, 8		
USFS Aerial Detection Survey	2008	USFS		Aerial Detection Survey Draft Results (Sierra National Forest, Inyo National Forest) Shows diseased trees on maps, fire and fuel locations.	http://www.fs.fed.us/r5/sf/fhp/fhm/aerial/draft/index.shtml	No	No	fire, fuels, vegetation management		9		
Ecological Assessment of Aquatic Resources: Linking Science to Decision-Making	2000	Michael T. Barbour, ed., et al.	Available in Carolyn Hunsaker's Library; Setac Press (Society of Environmental Toxicology and Chemistry)	Ecological Assessment Formulation, Engaging community stakeholders, Designing data collection, interpreting results of ecological assessments, valuing ecological resources, translating ecological science, Injecting ecological knowledge into decsion-making process, case studies for forumulating effective questions			No	health indicator assessing	Book	1		

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Oakhurst Area Plan	Sept 2005	Oakhurst Plan		Planning document with section called Environmental Setting that contains info on watersheds, geology, vegetation, wildlife, etc.	pdf, available at: http://www.madera-county.com/rma/archives/uploads/1157730052_Document_upload_oakhurstareaplan.pdf	Yes		geology, vegetation, wildlife	PDF	4, 3, 9		
Oakhurst-Ahwahneed Area General Growth	1980			Maps - GIS,HUC, (watershed and sub-watersheds) Topographic, Satellite, flood maps, DEM (Digital Elevation Model), Aerial		Yes		maps				
Proposed Groundwater Monitoring Program for Madera County	2008	Calflora	Calflora 1700 Shattuck Ave. #198, Berkeley, CA 94709 510 528-5426	Calflora has a searchable database listing invasive species and reported observations. Searchable areas include the San Joaquin River areas.	http://www.calflora.org/	No	No	Invasive species, vegetation manage	Online se	9		
Revision of the workplan: Learning how to apply adaptive management in the Sierra Nevada Forest Plan Amendment	2007	University of California Science Team		Goal of the research proposed in plan is to learn how to use an adaptive management and monitoring system to understand ecosystem behavior, incorporate stakeholder participation, and inform the implementation of adaptive management for Forest Service lands in the Sierra Nevada. Focal questions: fire and forest ecosytem health; participatory processes; water quantity and quality; wildlife. One study site is in Fresno River basin	pdf, available at http://snamp.cnr.berkeley.edu/documents/91/	Yes	No	vegetation management, public participation, fire, fuels, wildlife	PDF	9, 4		
Sanitary Engineering Investigation of Course Gold Creek. Prepared for Tital Group, Inc.	Mar-71	California Invasive Plant Council	California Invasive Plant Council 1442-A Walnut St. #462 Berkeley, CA 94709 (510) 843-3902	CIPC has risk assessment mapping of CA invasive plant species. Mapping includes the San Joaquin watershed areas.	http://www.cal-ipc.org/ip/mapping/statewide_maps/index.php	No	No	vegetation management, invasive species	Online se	9		
Sierra National Forest Supervisors Office, Water Quality by PWI, Water Quality Records for the Sierra National Forest	1984	Earle Franks, Frank Estril				Will be up on Fresno River Program website soon		water quality		7		
Sierra Watershed Community Directory	2005	Sierra Nevada Alliance		Directory of watershed councils, organizations, coordinated resource management processes, and conservation groups that work to conserve, protect, and restore watershed health in the Sierra Nevada. Contains map of Sierra Nevada	pdf; available at: http://www.sierranevadaalliance.org/publications/db/pics/1111699364_4254.f_pdf.pdf	Yes	No	watershed directory	PDF	1		
State of Sierra Waters: a Sierra Nevada Watersheds Index	2006	Kerri Timmer, Megan Suarez-Brand, Janet	Sierra Nevada Alliance	Uses publicly available data to measure and assess watershed health for 24 watersheds in Sierra. Uses indicators and provides baseline data. Offers recommendations for ways to improve watershed health. Includes individual	pdf. Available at www.sierranevadaalliance.org	Yes	No	water quality	PDF	7		
Streams of the San Joaquin, El Valle De Los Tulares - The Valley of the Tules, Geographic and Ecological Considerations of California's San	2002	Robert Edminster	Published by Robert Edminster	Focuses on the ecology of the San Joaquin Valley. In addition to discussing the streams themselves, this publication has quite a bit of information on plant communities and wildlife.		Will be up on Fresno River Program website soon		vegetation, plants, ecology, wildlife		4		

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Surface Water Ambient Monitoring Program, Fresno River Watershed, Annual Report Fiscal Year 2001-2002	July 2003	Pamela Bufurd, Annee Ferranti	Staff Report of the California Environmental Protection Agency and State Water Resources Control Board, Central Valley Region	The SWAMP has provided funding to develop a surface water monitoring program to evaluate water quality within the San Joaquin River basin. Water quality results have been assessed using the water quality objectives contained in the Water Quality Control Plan for the Sacramento and San Joaquin Rivers – Fourth Edition 1998. During Fiscal Year 2001-2002, the intent of the study was to begin baseline sampling and gather preliminary data from the Fresno River and Hensley Lake. Algal blooms have been observed in Hensley Lake. The Fresno River watershed has been identified	pdf; available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/fresnorvr_ann_rpt0102.pdf	Yes	No	water quality	PDF	7		
Upper Fresno River Watershed	in progress	Jones & Stokes 2600 V Street Sacramento, CA 95818-1914 Contact: Russ Grimes or Mike Rushton	Central Valley Regional Water Quality Control Board 11020 Sun Center Drive, Suite 200 Rancho Cordova, CA 95670 Contact: Devra Lewis	Irrigated Lands Program Existing Conditions Report for the Central Valley. Prepared by Jones & Stokes for the CVRWQB. Covers watershed basins and sub-basins in the Central Valley. Areas include General Description of each, plus land use patterns, basin plan status, impaired status, and water quality of each watershed. Report covers the San Joaquin.		No	No	water quality, land use	PDF	4, 8		
Development of an environmental indicator system for watershed-based decision-making and tracking the outcomes of beneficial use restoration in the San Joaquin	2007	Thomas Jabusch and Rainer Hoenicke San Francisco Estuary Institute Christina Swanson	Jabusch, T., Swanson, C., Pawley, A., and R. Hoenicke (2007).	Development of an environmental indicator system for watershed-based decision-making and tracking the outcomes of beneficial use restoration in the San Joaquin River basin	http://www.sfei.org/watersheds/reports/556indicators-report-finalFINAL.pdf	No	No	Health indicator assessing	PDF	12		
Watershed Management and Water Yield		Theodore E. Adams, Jr., Ray Coppock	UC Water Task Force, Cooperative Extension University of California Division of Agriculture and Natural Resources, Leaflet 21420	Pamphlet on managing vegetatation (e.g. prescribed burning of brushlands) to increase water yield and protect against fire.		will be up on Fresno River Program website soon	No	vegetation management, water supply, fuels, fire	PDF	9		
Environmental Protection Indicators for California (EPIC)		CAL/EPA OEHHA -- Office of Environmental Health Hazzard Assessment	Office of Environmental Health Hazard Assessment 1001 I Street, 12th Floor, Sacramento, CA 95814 P. O. Box 4010, Sacramento, CA 95812-4010 Phone: (916) 324-2829 FAX: (916) 322-9705	Environmental Protection Indicators for California (EPIC) describes the process for the identification and selection of environmental indicators that are adopted as part of the EPIC system, and presents the initial set of environmental indicators.	http://www.oehha.ca.gov/multimedia/epic/Epicreport.html	No	No	health indicator assessing	PDF	12		

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CAL/Ecotox		CAL Office of Environmental Health Hazzard Assessment	OEHHA 1001 I Street, 12th Floor, Sacramento, CA 95814	Cal/Ecotox database provides ecological, physiological, and toxicity data for California fish, reptiles, mammals, amphibians and birds.	searchable database at: http://www.oehha.ca.gov/cal_ecotox/DEFAULT.HTM	No	No	wildlife, biological monitoring	Online se	4		
SJR Flight Line Images		US Bureau of Reclamation	Ayres Associates 2445 Darwin Road Madison, WI 53704 (608)249-0471	San Joaquin River, U.S. Bureau of Reclamation, Flight Line Index 4 Images of SJR named for the miles of river they cover.		No, we have the 4 SiD files and one DGN file.	No	SJR Map	GIS, MrSID	1		
The Guide to Environmental Policy and Sustainable Development		Nataliia Sergeevna Mirovitskaia, William Ascher	Published by Duke University Press, 2001 ISBN 0822327457, 9780822327455 (391 pgs)	The Guide to Environmental Policy and Sustainable Development is a comprehensive presentation of definitions, philosophies, policies, models, and analyses of global environmental and developmental issues.			No	Health indicator assessing	Book	12		
Environmental Indicators		Allen Hammond	World Resources Institute (June 1995) ISBN-10: 1569730261 (43 pgs)	Environmental Indicators: A systematic Approach to measuring and reporting on Environmental Policy Performance in the context of sustainable development			No	Health Indicator assessing	Book	12		
Biological Response Signatures		Thomas P. Simon	CRC; 1 edition (July 17, 2002)	Patterns Using Aquatic Communities is the first book that evaluates the application of multimetric indices and biological indicators as endpoints in order to determine the relevancy of monitoring and evaluation programs in North America so that patterns in biological responses can be assessed.			No	Health indicator assessing	Book	12		
Restoring Life in Running Waters		James R. Karr	Island Press; 1 edition (November 1, 1998)	Restoring Life in Running Waters: Better Biological Monitoring				Health Indicator assessing	Book	12		
Chesapeake Bay Report Card 2007		Eco Check Partnership Program	http://www.eco-check.org/reportcard/chesapeake/2007/	Chesapeake Bay Report Card 2007: A geographically detailed integrated assessment of Chesapeake Bay Health	http://www.eco-check.org/reportcard/chesapeake/2007/	No	No	Assessing	PDF	12		
CEQAnet Clearinghouse Database		State of California Energy Regulatory Commission	State of California Federal Energy Regulatory Commission	CEQAnet Clearinghouse Database - environmental documents filed with the state clearinghouse. Documents include EIR's.	http://www.ceqanet.ca.gov/QueryForm.asp	No	No	Environmental documents EIR	Online searchable database	4, 6, 8		
Draft Environmental Impact Statement for the Big Creek Projects		888 First Street, NE Washington, DC 20426	888 First Street, NE Washington, DC 20426	Draft Environmental Impact Statement for the Big Creek Projects Project No. 120-020, Project No. 67-113, Project No. 2175-014, and Project No. 2085-014 Issued: September 12, 2008	http://www.ferc.gov/industries/hydropower/enviro/eis/2008/09-12-08.asp	No	No	EIR Big Creek	PDF	4, 6, 8		

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USGS Site Inventory Well Data for California		Geological Survey 345 Middlefield Road Menlo Park, CA 94025, USA	U.S. Geological Survey 345 Middlefield Road Menlo Park, CA 94025, USA Phone:650-853-8300	USGS Site Inventory Well Data for California	http://waterdata.usgs.gov/ca/nwis/inventory	No	No	well data, water quality	Online searchable database	7		
CA DWR, GIS Maps, SJR		Joe Christen	Joe Christen Environmental Scientist Municipal Water Quality Investigations CA Dept of Water Resources office 916.651.9690 mobile 916.216.8220	GIS Map of Water Quality monitoring stations of all agencies on the San Joaquin River below Millerton Lake.	N/A	No	No	GIS map, water quality	PDF, Excel spreadsheet	1, 7		
California Environmental Information Clearinghouse (CEIC)		California Environmental Information Clearinghouse	http://ceic.resources.ca.gov/	Online searchable database for GIS data and prjoect data. Searchable areas include: Biota/Environment, Ocean/water, Agriculture, Society/Infrastructure.	http://ceic.resources.ca.gov/search.html	No	No	GIS data	Online searchable database	1		
StreamNet		SteamNet	http://www.streamnet.org/	Pacific Northwest's fish and wildlife agencies and tribes and is administered by the Pacific States Marine Fisheries Commission. Provides data and data services in support of the region's Fish and Wildlife Program and other efforts to manage and restore the region's aquatic resources.	http://www.streamnet.org/online-data/datastore.html	No	No	wildlife fish	Online searchable database	4		
Natural Resources Conservation Service		Natural Resources Conservation Service	Natural Resources Conservation Service 14th and Independence Avenue, SW Washington, DC 20250	The NRCS is a federal conservation department in the US Dept of Food and Agriculture. Their Technical resources include GIS data, geospatial data gateway, forestry, range and pasture, soils and water resources.	http://www.nrcs.usda.gov/technical/	No	No	GIS data, forestry, agriforestry, water, soils, range and pasture, ecology, cultural resources	Online databases	1, 4, 3, 8,		
California Department of Forestry & Fire		California Department of Forestry and Fire	http://frap.cdf.ca.gov/watersheds/data.asp?HUC=18040006	Watershed reports in California. Effects of woody debris and fire on San Joaquin watershed.	http://frap.cdf.ca.gov/watersheds/reports.html	No	No	wildfire, watershed	PDF, Fire data in GRID format	4, 9		

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California Department of Fish & Game (CDFG) BIOS		California Department of Fish and Game	DFG Headquarters 1416 9th Street, Sacramento, CA 95814 • Google Map (916) 445-0411	management, visualization, and analysis of biogeographic data collected by the Department of Fish and Game and its Partner Organizations. In addition, BIOS facilitates the sharing of those data within the BIOS community. BIOS integrates GIS, relational database management, and ESRI's ArcIMS technology to create a statewide, integrated information management tool that can be used on any computer with access to the Internet.	http://bios.dfg.ca.gov/	No	No	GIS data	Online searchable database	1		
Natural Resources Council		National Resources Council	National Academies Press 888-624-8373 http://www.nap.edu/catalog/12223.html	National Resources Council - Hydrological effects of a changing forest landscape - Executive Summary	http://www.nap.edu/catalog/12223.html	No	No	hydrology forest management	PDF	2, 8		
USFS TreeSearch		USFS	US Forest Service P.O. Box 96090 Washington, D.C. 20090-6090 (202) 205-8333	Online searchable database for USFS research publications.	http://www.treesearch.fs.fed.us/	No	No	research project forestry forest management	PDF	8, 4		
Eastern Madera County and Mariposa County Long Term Plan MC2LTP		Central Sierra Watershed Committee	Central Sierra Watershed Committee November 2001	Eastern Madera County and Mariposa County Long Term Plan MC2LTP for Watershed Conservation and Restoration Includes the San Joaquin watershed. Managing watershed. Background info, community info, permitted and known facilities, potential problems, planned projects, monitoring and beneficial uses.		No	No	vegetation and water management, septic systems, roads, watershed planning, sedimentation	MS WORD Doc	9, 8		
2007 Update for Eastern Madera County and Mariposa County Long Term Plan MC2LTP	2007	Central Sierra Watershed Committee	Central Sierra Watershed Committee January 2007	2007 Update for Eastern Madera County and Mariposa County Long Term Plan MC2LTP for Watershed Conservation and Restoration Includes the San Joaquin watershed. Managing watershed. Background info, community info, permitted and known facilities, potential problems, planned projects, monitoring, and beneficial uses.		No	No	vegetation and water management, septic systems, roads, watershed planning, sedimentation	CD	9, 8		
USGS		USGS		Publications, water resources reports. Also includes real-time water quality, water temperature, and daily stream-flow conditions.	http://water.usgs.gov/pubs/	No	No	water quality, water temperature, stream-flow	Online searchable database	7		

NAME	Year of Publication	AUTHOR	Publication Info	Description	Website Address	Need to Acquire	Info on website?	Index	Data Format	Chapter Key	Legend	version 1.8
Envirofacts Data Warehouse	2008, Updated regularly	US EPA	Environmental Protection Agency Ariel Rios Building 1200 Pennsylvania Avenue, N.W. Washington, DC 20460 (202) 272-0167	Searchable online database for hazardous waste and superfund sites	http://oaspub.epa.gov/enviro/ef_home2.waste	No	No	hazardous waste superfund site	Online searchable database	6		
California Dept. of Fish & Game (CDFG) CWHR		California Dept. of Fish and Game	California Wildlife Habitat Relationships (CWHR)	CWHR contains life history, geographic range, habitat relationships, and management information on 694 species of amphibians, reptiles, birds, and mammals known to occur in	http://www.dfg.ca.gov/biogeodata/cwhr/	No	No	wildlife habitat	Software and GIS Data	1, 4		
Dangerous Development		Sierra Nevada Alliance	Sierra Nevada Alliance PO Box 7989 South Lake Tahoe, CA 96158	Dangerous Development - Wildfire and Rural Sprawl in the Sierra Nevada. Report on wildfire, population growth, development and consequences of current land use methods. Includes fire and land use statistics for Fresno and Madera Counties.	http://www.sierranevadaalliance.org/publications/db/pics/1190122868_27040.f_pdf.pdf	No	No	wildfire watershed land use population growth	PDF	8, 9		
Shaver Lake Forest Specific Plan	1973, amended 1993	Wilsey & Ham Planners and Engineers	1973, amended 1993 prepared for Fresno County by Wilsey & Ham 393 Vintage Park Drive, Suite 100 Foster City, CA 94404 Phone:(650) 349-2151	Shaver Lake Forest Specific Plan - Refinement of Sierra Foothills General Plan. Includes land use, development, standards for population and building density, water supply, drainage, waste disposal, standards for conservation and natural resources includeing underground and surface waters, forests, soils, vegetation and wildlife specific to the Shaver Lake Forest (as defined within the plan.)	http://www.co.fresno.ca.us/departmentpage.aspx?id=19705	No	No	land use, soil liquefaction water supply, sewer ssytem	PDF	3, 7, 8		
Final EIR of Fresno County's General Plan.		County of Fresno	County of Fresno 2220 Tulare Street, 6th floor Fresno, CA 93721	Final EIR of Fresno County's General Plan. Includes environmental analysis of water resources, biological resources, forestry resources, mineral resources, air quality and sesmic and geologic hazards.	http://www2.co.fresno.ca.us/4510/4360/General_Plan/GP_Final_EIR/EIR/toc.html	Yes	No	EIR, water resources, air quality, geology, forestry resources		11, 6, 7, 2, 8		
The Natural Resource Projects Inventory (NRPI)	2008, updated	Natural Resources Projects Inventory (NRPI)	ICE, UC Davis Dept. of Environmental Science and Policy Phone: (530) 752-2378 Email: kcward@ucdavis.edu	began as a collaborative effort between UC Davis Information Center for the Environment (ICE) and the California Biodiversity Council (CBC) in 1995. In response to a growing need for more project related data on California's natural resources, existing inventories* were synthesized into one database and thousands of new projects have been added through individual online entries and electronic database transfers. Today, NRPI is the most comprehensive statewide database of its kind in California with over 6,000 natural resource projects searchable on the Internet. These projects include watershed conservation and acquisition, restoration and noxious weed eradication, assessment, planning, and	http://www.ice.ucdavis.edu/nrpi/Home.aspx	No	No	water quality, watershed conservation, invasive pests, vegetation management, fire,	Searchable database	2, 4, 7, 8, 9, 10		

NAME	Year of Publication	AUTHOR	Publication Info	Description	Website Address	Need to Acquire	Info on website?	Index	Data Format	Chapter Key	Legend	version 1.8
USJR Plant and Animal Species Fect Sheet	2008	multiple see report	Nature Serve Explorer Database	Comprehensive list of 63 animal and plant species in the USJR watershend. Includes endangered / legal status, population / occurrence viability, distribution and some images.	http://www.natureserve.org/explorer/	Yes	No	Serch-> by location -> >watershed -> USJR	paper & pdf			
FEIS for the Sierra Nevada Forest Amendment Plan	2003	USFS		Sierra Nevada Forest Plan. Includes information on fire prevention plan for the next 20 years and the history of fire in the forest and describes existing forest conditions using (1) vegetation density and composition; (2) insects, pathogens and related mortality levels; and (3) forest regeneration.	http://www.fs.fed.us/r5/snfpa/final-seis/	Yes	No	Volume 1, Chapter 3, part	PDF			
California GAP Analysis	1998	F.W., Davis, et al.	University of California Santa Barbara, Biogeography Lab	Using a GIS overlay of biological distribution evaluates the management status of plant communities, vertebrate species and vertebrate species richness.	http://www.biogeog.ucsb.edu/projects/gap/gap_home.html	No	No					
Sierra Nevada Ecosystem Project	1996		Report to congress also known as DDS-43	32 data sets and metadata files for Sierra National Forest. Large and comprehensive assessment of the status of Sierra Nevada natural resources and their relationship to human well being. Includes geology, fire, ecology, wildlife, streams and rivers and development in the Sierra Nevada Range.	http://ceres.ca.gov/snep/pubs/es.html	No	No	metadata: http://www.ice.ucdavis.edu/snep/region.asp?region=7	online digital library			
Planning for the Future - A Sierra Nevada Land Use Index	2005	Joan Clayburgh and Shannon Raborn	Sierra Nevada Alliance	Statistics divided by county. Projected growth for 2020. Building permits issued per year. Registered vehicles and miles of road. 102 pages.	http://www.sierranevadaalliance.org/publications/db/pics/1119363058_28429.f_pdf.pdf	No	No		PDF			
Troubled Water of the Sierra	2003	Kerri L. Timmer	Sierra Nevada Alliance	health index, The report also includes a number of appendices on dams in the Sierra, the Clean Water Act 303(d) list for the Sierra, Index of Biotic Integrity, Potential ADMA list, Collaborative Watershed Groups in the Sierra and an Annotated Source List.								
California Dept. Fish & Game: CalFish Database	2008, Updated		CDFG	CalFish provides direct access to many different types of data relating to fish and aquatic habitat data. These data include categories such as: - Population trends and counts - Distributions - Migration barriers - Hatcheries - Habitat restoration projects - Genetics - Monitoring	http://dnn.calfish.org/calfish2/FishDataandMaps/tabid/87/FishData/tabid/89/Default.aspx	No	No	fish habitat	Online searchable database	4		
CA Governor's Office of Emergency Services (OES)	2008, Updated		Governor's Office of Emergency Services 3650 Schriever Ave, Mather, CA 95655 Main Number Website (916) 845-8510	California searchable online database for hazardous waste. http://www.oes.ca.gov/Operational/MALHaz.nsf/498d895aa750af4e8825659c006cf303/$searchForm?SearchView	http://www.oes.ca.gov/	No	No	spills, hazardous waste	Online searchable database	6		

NAME	Year of Publication	AUTHOR	Publication Info	Description	Website Address	Need to Acquire	Info on website?	Index	Data Format	Chapter Key	Legend	version 1.8
FSGeodata Clearinghouse	2008, Updated		USFS Databases	Forest Service datasets, GIS, Aerial Survey, Aerial insect & disease, land cover monitoring, forest health protection data, FIA spatial data.	http://svinetfc4.fs.fed.us/clearinghouse/other_fs/other_fs.html	No	No	forestry, vegetation management	Online searchable database	1, 4, 9, 10		
California Spatial Information Library	2008, Updated		CaSIL 900 N St. Sacramento, Ca. 95814 (916) 653-1369 http://gis.ca.gov/index.epl	map layers including Federal Water Districts - Mid-Pacific Region Private Water Districts for California 1:24,000-scale State Water Districts for California	http://gis.ca.gov/BrowseCatalog.epl	No	No	GIS maps, district boundaries	GIS	1		
California Environmental Resources Evaluation System (CERES)	2008, updated			technology, data, and community. The first, technology, includes the development of new software and network structures to accommodate the search and retrieval, organization, and accessibility demands associated with huge volumes of data in a wide range of forms. The second, data, encompasses the conversion of vast quantities of information into digital form as well as the evaluation of existing digital data sets and the development of metadata catalogs required searching and data-quality and appropriate use assessment. The third, community, contains CERES' efforts to promote the use of the network for planning and policy and to foster the growth of new users and contributors in a far-	http://ceres.ca.gov/	No	No		online searchable database			
California Watershed Portal (CWP)	2008, Updated	CA DWR	cwp@resources.ca.gov	Identifies ongoing watershed activities, provides access to important data and information, and links to the larger California Watershed community.	http://cwp.resources.ca.gov/	No	Yes	watershed maps & info				
California Office of Environmental Health Hazard Assessment	2008, Updated		(510) 622-3200	Water bodies with fish consumption advisories Office of Environmental Health Hazard Assessment (OEHHA)	http://www.oehha.ca.gov/fish.html		No	fish health soils,	PDF	6		
Fresno County Soil Survey		USDA		Eastern Fresno area Soil Survey map		No	No	geology Map,	PPT	3		
Precipitation Map of the San Joaquin Watershed	2002	M. Spiess	Science Leadership Institute	Precipitation Map of the San Joaquin Watershed		No	No	precipitation, water supply	PDF	7		
US EPA comments on the Draft Environmental Impact Statement for the Millerton Lake Resource Management Plan/General Plan (RMP/GP), Madera and Fresno Counties, CA.	2008	Kathleen M. Goforth (415) 972-3521 or contact Laura Fujii (415) 972-3852 or fujii.laura@epa.gov	US EPA	US EPA comments on the Draft Environmental Impact Statement for the Millerton Lake Resource Management Plan/General Plan (RMP/GP), Madera and Fresno Counties, CA.		No	No	air quality, water resources, wastewater, biological resources, climate change, land use	PDF	1, 4, 5, 7, 11		

NAME	Year of Publication	AUTHOR	Publication Info	Description	Website Address	Need to Acquire	Info on website?	Index	Data Format	Chapter Key	Legend	version 1.8
Watershed Research in the Central Sierra Nevada of California: Nitrogen and Ozone	2007	Carolyn Hunsaker, et al. chunsaker@fs.fed.us	USFS	objective for the Forest Service scientists and managers working for the U.S. Dept. of Agriculture. Air pollution, specifically ozone (03) and nitrogenous (N) air pollutants, may severely affect the health of forest ecosystems in the western U.S.		No	No	air pollution, ozone	Paper			
California Water Plan Update 2005	2005	CA DWR	CA DWR	The California Water Plan provides a framework for water managers, legislators, and the public to consider options and make decisions regarding California's water future. The Plan, which is updated every five years, presents basic data and information on California's water resources including water supply evaluations and assessments of agricultural, urban, and environmental water uses to quantify the gap between water supplies and uses.	http://www.waterplan.water.ca.gov/previous/cwpu2005/index.cfm	No	No	water resources, water supply, agricultural water, use, urban water use, environmental water use				
Water Quality Planning Tool	2006		Sacramento CSU Stormwater Program	for Caltrans to use applicable water quality standards while developing strategies for achieving regulatory compliance with storm water permits. The information on water quality is divided in to hydrologic sub-areas (HSAs). To find a HSA use the HSA name or post-mile of the road in an HSA.	http://stormwater.water-programs.com/	No	No	water quality	Online searchable database	7		
North Fork Casino Draft Environmental Impact Statement	2008	North Fork Rancheria of Mono Indians		Draft Environmental Impact Statement (DEIS) has been prepared by the Bureau of Indian Affairs (BIA) to address the potential environmental effects of a proposed 305-acre fee-to-trust land acquisition in unincorporated Madera County, California.	http://www.northforkeis.com/documents/draft_eis/Draft_EIS.htm	Yes	No	water quality, flood zones, air quality, water resources	PDF	1, 7, 9, 11		
Ozone Air Pollution in the Sierra Nevada: Distribution and Effects on Forests	2003	Andrzej Bytnerowicz, ed. Et al.	Available in Carolyn Hunsaker's Library; Elsevier publisher	Nevada ecosystems; Analysis of spatial patterns of urban transported ozone in the Sierra Nevada; Research and development needs for the Sierra Nevada; and International perspective of the Sierra Nevada research			No	air pollution, ozone	Book	11		
Biomonitoring in the Water Environment			Available in Carolyn Hunsaker's Library; Water Environment Federation publisher	Sections: Quality assurance and data analysis; watershed/regional assessment and in-stream monitoring; toxicity identification evaluations; case studies;			No	health indicator assessing	Book	1		

NAME	Year of Publication	AUTHOR	Publication Info	Description	Website Address	Need to Acquire	Info on website?	Index	Data Format	Chapter Key	Legend	version 1.8
Fragmentation of Riparian Floras in Rivers with Multiple Dams	1998	Roland Jansson, et al.	Ecology: Vol. 81, No. 4, pp. 899-903.	resulting in disruption of natural dispersal pathways and subsequent changes of riverine communities. We assessed the effect of dams as barriers to plant dispersal along rivers by comparing the flora of vascular plants between pairs of run-of-river impoundments in northern Sweden. Adjacent impoundments in similar environmental settings develop different riparian floras because species with poor floating capacity become unevenly distributed among impoundments. Such discontinuities were not found along a free-flowing river, suggesting effective dispersal of riparian plants in the absence of dams. Given that dams regulate most of the world's rivers, floristic disruptions of riparian corridors may be a global phenomenon. The extensive fragmentation of other ecosystems may have caused similar obstructions to organism dispersal, with dramatic changes in flow, reducing their natural ability to adjust to and absorb disturbances.	http://www.esajournals.org/doi/abs/10.1890/0012-9658(2000)081%5B0899%3AFORFIR%5D2.0.CO%3B2?prevSearch=null&searchHistoryKey=		No	vegetation management	Journal Article	9		
Climate change and the world's river basins: anticipating management options	Mar-08	Margaret A. Palmer, et al.	Frontiers in Ecology and the Environment: Vol. 6, No. 2, pp. 81-89.	Given expected changes in global climate and water needs, this may create serious problems, including loss of native biodiversity and risks to ecosystems and humans from increased flooding or water shortages. Here, we project river discharge under different climate and water withdrawal scenarios and combine this with data on the impact of dams on large river basins to create global maps illustrating potential changes in discharge and water stress for dam-impacted and free-flowing basins. The projections indicate that every populated basin in the world will experience changes in river discharge and many will experience water stress. The magnitude of these impacts is used to identify basins likely and almost certain to require proactive or reactive management intervention. Our analysis indicates that the area in need of management action to mitigate the impacts of climate change is much greater for	http://www.esajournals.org/doi/abs/10.1890/060148?prevSearch=null&searchHistoryKey=		No	climate change, global warming	Journal Article	5		
bullfrogs, Rana Catesbeiana, on the Native Frogs of the San Joaquin Valley, California		Peter B. Moyle		Rana catesbeiana was introduced into Califolnia between 1914 and 1920 and has since spread throughout the state. In the Sail Joaquin valley it has become the dominant frog on the valley floor and has spread into Sierra Nevada foothills.	http://www.waterboards.ca.gov/water_issues/programs/tmdl/records/region_5/2006/ref368.pdf	No	No	wildlife, invasive species	PDF	10		
Ground Water Quality Data in the Central Sierra Study Unit, 2006 Results from the California GAMA Program	2006	USGS, USFS & in partnership with CA state water resources control board	For product and ordering information: World Wide Web: http://www.usgs.gov/pubprod Telephone: 1-888-ASK-USGS	Groundwater quality data in the Bass Lake and Willow Creek areas.	http://www.waterboards.ca.gov/water_issues/programs/gama/docs/central_sierra.pdf	No	No	groundwater	PDF	2		

NAME	Year of Publication	AUTHOR	Publication Info	Description	Website Address	Need to Acquire	Info on website?	Index	Data Format	Chapter Key	Legend	version 1.8
State of Sierra Frogs: A report on the status of frogs and toads in the Sierra Nevada & California Cascade Mountains	July, 2008	Marion Gee, Sara Stansfield, & Joan Clayburgh	Sierra Nevada Alliance P.O. Box 7989 South Lake Tahoe, CA 96158 Phone: 530.542.4546 Fax: 530.542.4570 Email:info@sierranevadaalliance.org www.sierranevadaalliance.org	A report on frogs in the sierra nevada.	http://www.sierranevadaalliance.org/publications/db/pics/1223424345_3864.f_pdf.pdf	No	No	wildlife	PDF	4		
Health Data Summaries for California Counties 2006	2006		Prepared by: Sally Jew-Lochman Department of Health Services Planning and Data Analysis Section M.S. 5103, P.O. Box 997410 Sacramento, CA 95899-7410	Vital health records broken down by county, includes Madera and Fresno Counties.	http://www.cdph.ca.gov/pubsforms/Pubs/OHIRdatasummariesCA2006.pdf	No	No	socio-economic		1		
Declines of the California Red-Legged Frog: Climate, uv-b, Habitat, and Pesticides Hypotheses	Apr-01	Carlos Davidson, Bradley Shaffer, and Mark R. Jennings	Ecological Applications: Vol. 11, No. 2, pp. 464-479.	frog (Rana aurora draytonii) has disappeared from much of its range for unknown reasons. We mapped 237 historic locations for the species and determined their current population status. Using a geographic information system (GIS), we determined latitude, elevation, and land use attributes for all sites and analyzed the spatial pattern of declines	http://www.esajournals.org/doi/abs/10.1890/1051-0761(2001)011%5B0464%3ADOTCRL%5D2.0.CO%3B2?prevSearch=null&searchHistoryKey=		No	wildlife	Jornal Article		4	
Sierra Nevada Adaptive Management Plan	Updated regularly			Project has been formed to develop, implement and test Adaptive Management processes through testing the efficacy of Strategically Placed Landscape Treatments (SPLATs) across four response variables, including* public participation * wildlife, focusing on the Pacific Fisher and the California Spotted Owl * water * fire/forest health	http://snamp.cnr.berkeley.edu/		No	fire, fuels, vegetation management, wildlife		4, 9		
Least Cost CVP Yield Increase Plan	Oct-95		IJ.S. Department of the Interior Bureau of Reclamation, Mid-Pacific Region Fish and Wildlife Senrice	The Least Cost CVP Yield Increase PIan) is a report to Congress describing possible actions to increase the yield of the Central Valley Project (CVP). The CVP is the largest water storage and delivery system in Califomia.	http://www.usbr.gov/mp/cvpia/docs_reports/docs/least_cost_cvp_yield_increase_plan.pdf	No	No	water supply	PDF	7		
EDNA Derived Watersheds for Major Named Rivers				Elevation Derivatives for National Application (EDNA) Watershed Atlas contains watershed characteristics for major named rivers of the contiguous U.S. including maps, images, legends, and statistics derived from the EDNA Watershed Characteristics model.	http://edna.usgs.gov/watersheds/	Yes	No	Maps DEM	GIS, KLM	1		
Geo Community				Online digital data depot containing GIS data for Madera and Fresno County: Tiger, NED, NWI wetlands, digital raster graphics, DLG, DEM	http://data.geocomm.com/catalog/US/61069/1611/index.html		No	Maps	GIS, other	1		

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				(CA) Hydric Soils (CA) Storie Index Rating (CA) The following local interpretations are included: Basin, Border, and Furrow Irrigation (CA) California Revised Storie Index Rating (CA) Camp Areas, Off-Road Motorcycle Trails and Paths and Trails (CA) Desert Tortoise (CA) Dwellings and Small Commercial Buildings (CA) Landfills (CA) Picnic Areas, Playgrounds, and Lawns, Landscaping, Golf Fairways (CA) Ponds and Embankments (CA) Roads and Streets and Shallow Excavations (CA) Sewage Disposal (CA) Source of Reclamation Material, Roadfill, and Topsoil (CA)							
Soil Data Mart			USDA NRCS	Source of Sand and Gravel (CA)	http://soildatamart.nrcs.usda.gov	No	GIS	Arcview shape file	2		
Approach: Healthy Ecosystems And Sustainable Economies, Volume II, Implementation	Nov-05	Interagency Ecosystem Management Task Force	Available in CSUF library		http://openlibrary.org/b/OL541281M	No	ecosystem management		1		
Fresno County Regional Data Center		2035 Tulare Street Suite 201 Fresno, CA 93721 (559) 233-4148	website info		http://www.fresnocog.org/document.php?pid=20	No	census data, county statistics	PDF and online data	1		
California Water Science Center		California Water Science Center 6000 J Street Sacramento, CA 95819		Here you'll find information on California's rivers and streams. You'll also find information about ground water, water quality, and many other topics. The USGS operates the most extensive satellite network of stream-gaging stations in the state, many of which form the backbone of flood-warning systems.	http://ca.water.usgs.gov/	No	water quality, ground water, water flow		2		
The Ecosystem Approach: Healthy Ecosystems And Sustainable	Sept. 1996	Interagency Ecosystem Management Task Force			http://openlibrary.org/b/OL541281M	No	ecosystem management				
CA Office of Spill Prevention and Response (OSPR)			CA Dept. Fish & Game OSPR 1700 K Street, Suite 250 Sacramento, CA 95811 (916) 445-9338	The mission of Office of Spill Prevention and Response (OSPR) is to provide best achievable protection of California's natural resources by preventing, preparing for, and responding to spills of oil and other deleterious materials, and through restoring and enhancing affected resources.	http://www.dfg.ca.gov/ospr/	No	spills, hazardous waste	Online reports of major spills in california	6		

NAME	Year of Publication	AUTHOR	Publication Info	Description	Website Address	Need to Acquire	Info on website?	Index	Data Format	Chapter Key	Legend	version 1.8
Macroinvertebrate Assemblages of the San Joaquin River Watershed		Victor de Vlaming, Dan Markiewicz, Kevin Goding, Adam Morrill and Jay Rowan	Aquatic Toxicology Laboratory, School of Veterinary Medicine: APC, 1321 Haring Hall, University of California, Davis 95616 California Regional Water Quality Control Board, 11020 Sun Center Drive #200, Rancho Cordova, CA 95670-6114	This study assessed benthic macroinvertebrate (BMI) habitat in the lower San Joaquin River.		No	No	BMI benthic macroinvertebrate wildlife habitat, water quality	PDF	4		
Benthic Macroinvertebrate Bioassessment of San Joaquin River Tributaries: Spring and Fall 2002	Fall 2002	Daniel Markiewicz, Kevin Goding, Victor de Vlaming, and Jay Rowan	Aquatic Toxicology Laboratory, School of Veterinary Medicine: APC, 1321 Haring Hall, University of California, Davis 95616 California Regional Water Quality Control Board, 11020 Sun Center Drive #200, Rancho Cordova, CA 95670-6114	The objective of this study was to assess benthic macroinvertebrate (BMI) community structure and physical stream habitat conditions at several sites on tributaries to the San Joaquin River.		No	No	BMI benthic macroinvertebrate wildlife habitat, water quality	PDF	4		
California Natural Diversity Database (CNDDB)		CA Dept. of Fish and Game	Biogeographic Data Branch 1807 13th Street, Suite 202 Sacramento, CA 95811 (916) 322-2493 Information Services 916-324-3812	The California Natural Diversity Database (CNDDB) is a program that inventories the status and locations of rare plants and animals in California . CNDDB staff work with partners to maintain current lists of rare species as well as maintain an ever-growing database of GIS-mapped locations for these species.	http://www.dfg.ca.gov/biogeodata/cnddb/		No	GIS, wildlife	GIS, online viewable database	4		
DWR Bulletin 118	2003	SWR		Notes that 59% of Tulare Lake Region's water comes from surface, groundwater is 41% Quality, Groundwater Quality and Quantity, Fuels and Fire Safety, Invasive Species, Wildlife	http://www.groundwater.water.ca.gov/bulletin118/							
Millerton Area Watershed Coalition FERC License—Success	2008?	Cal State Parks		Describes area, plans for protecting environment and describes biological resources	http://www.sierrafoothill.org/watershed/	N Y						

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FERC License—Democrat Dam and Fairvew				aka KR1 and KR3 relicensing agreements. Money put in trust for river restoration. See http://www.sierrasouth.com/conservation.htm	http://www.sierrasouth.com/conservation.ht	N	Y					
FERC License—Pine Flat						Y						
FERC License—Terminus						Y						
FERC License—Upper						Y						
Madera County General Plan						Y						
Fresno County General Plan						N						
Tulare County General Plan				Very little info on water, but background report does have info on exisiting plans, sanitary sewer infrustructure information, storm drainage information, solid and hazardous waste, domestic water infrustructure and ch 8 is flood hazards	http://generalplan.co.tulare.ca.us/documents/GeneralPlan2010/Appendix%20B%20-%20Background%20Report.pdf	N	Y		PDF	7, 8		
Kern County				Specifies area plans in foothills		N						
Poso Creek IRWM Plan					https://faast.waterboards.ca.gov/PublicProposalsSearchCriteria.asp, PIN #5494							
Upper Kings Basin IRWM Plan					https://faast.waterboards.ca.gov/PublicProposalsSearchCriteria.asp, PIN #10789 & 13122							
Westside IRWM Plan					https://faast.waterboards.ca.gov/PublicProposalsSearchCriteria.asp, PIN #9601							
Kaweah Delta IRWM Plan					https://faas & 4938t.waterboards.ca.gov/PublicProposalsSearchCriteria.asp, PIN #6766							
Tule River IRWM Plan				Only draft currently available in print	https://faast.waterboards.ca.gov/PublicProposalsSearchCriteria.asp, PIN #4938							
FS, DFG, UFW agreement to Restore Volcano Creek Golden Trout				Not in existence yet Have a plan for restoration of the sensitive fish species in this watershed		N						
Water Rights court settlements from turn of century						Y						
State Bulleting 94 –1 on the Tule River						Y						
San Joaquin Restoration program						Y						
Upper San Joaquin Basin Storage						Y						
General data from S. Cal Edison and						Y						
State Water Plan Update 2005 and 2009	2009	DWR		Contains very little information on foothill/mountain water supplies and issues, but 2009 names SSIRWMP specifically	http://www.waterplan.water.ca.gov/previous/cwpu2005/index.cfm	N	Y		pdf			
Storm Water management plans												

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CA Data exchange center- groundwater assessment-						Y						

Working Documents Library
South Sierra IRWM Plan

Document	Region	Acquired (Yes/No)	Fromat (hardcopy or e-file)	Source (url or where to find it)	Notes/Abstract	Date
FERC License—Success Dam	Tule	No				
FERC License—Democrat Dam and Fairvew Dam	Kern	No			aka KR1 and KR3 relicensing agreements. Money put in trust for river restoration. See http://www.sierrasouth.com/conservation.htm	
FERC License—Pine Flat Dam	Kings	No				
FERC License—Terminus Dam	Kaweah	No				
FERC License—Upper Kings dams	Kings	No				
Madera County General Plan	Madera Co	No				
Fresno County General Plan	Fresno Co	No				
Tulare County General Plan	Tulare Cou	No				
Kern County General Plan	Kern Coun	No				
Poso Creek IRWM Plan	Kern Coun	Yes	e-file	https://faast.waterboards.ca.gov/PublicProposalsSearchCriteria.asp, PIN #5494		05/01/05

Upper Kings Basin IRWM Plan	Fresno Cou	Yes	e-file	https://faast.waterboards.ca.gov/PublicProposalsSearchCriteria.asp, PIN #10789 & 13122		08/31/07
Westside IRWM Plan	Kings Cour	Yes	e-file	https://faast.waterboards.ca.gov/PublicProposalsSearchCriteria.asp, PIN #9601		06/26/06
Kaweah Delta IRWM Plan	Tulare Cou	Yes	e-file	https://faas & 4938t.waterboards.ca.gov/PublicProposalsSearchCriteria.asp, PIN #6766		07/14/05
Tule River IRWM Plan	Tulare Cou	Yes	e-file	https://faast.waterboards.ca.gov/PublicProposalsSearchCriteria.asp, PIN #4938		05/11/05
FS, DFG, UFW agreement to Restore Volcano Creek Golden Trout to S. Fork Kern and Little Kern Creek	Kern	No				
Water Rights court settlements from turn of century	all	No				
State Bulleting 94 –1 on the Tule River	Tule	Yes				
San Joaquin Restoration program study	San Joaqu	No				
Upper San Joaquin Basin Storage Investigation	San Joaqu	No				
General data from S. Cal Edison and PG&E	all	No				

State Water Plan Update 2005	all	Yes	e-file	http://www.waterplan.water.ca.gov/previous/cwpu2005/index.cfm		2005
Storm Water management plans	all					
CA Data exchange center- groundwater assessment- statewide health of wells	all					
Sequoia and Kings Canyon National Parks General and Fire Management Plans			e-file			
Sierra National Forest General Management Plan			e-file			
Sequoia National Forest General Management Plan			e-file			

sub categories

water supply, habitat, current conditions, (SN adaptive managem ent) etc., Plans?

CONCEPTUAL PROPOSAL
Establish a Southern Sierra Conservation Cooperative to Collaboratively Adapt to Accelerated and Unprecedented Climate Change

(Potential) Partners to this Agreement

Partners who elect to participate in the Southern Sierra Conservation Cooperative (SSCC) may do so by authorizing an appropriate representative to act in their respective interests for matters related to this charter. This authority is established by each authorized representative on the original signatory page to this Charter or through an addendum signatory page, if warranted.

Federal Government
United States Department of the Interior,
- Fish and Wildlife Service: California Landscape Conservation Cooperative (LCC)
- National Park Service: Sequoia, Kings Canyon and Yosemite National Parks (NPS)
- Bureau of Land Management: Bakersfield Field Office (BLM)
- US Geological Survey: Western Ecological Research Center, Sequoia and Kings Canyon and Yosemite Field Stations (USGS)

United States Department of Agriculture, Forest Service:
- Sierra, Sequoia and Stanislaus National Forests and Giant Sequoia National Monument (USFS); and Pacific Southwest Research Station (PSW).

State of California
Sierra Nevada Conservancy – Whitney District

Tribal Governments
TBD?

Non-profit Organizations
The Nature Conservancy—California Office
California Audubon Society
Sierra Business Council
Sequoia Riverlands Trust
Tejon Ranch Conservancy

Background (The Place)

The Southern Sierra Nevada Ecoregion (Fig. 1) includes some of the most iconic natural resources and complex socioeconomic landscapes in the United States. A strong biophysical gradient characterizes the region. Over the span of about 40 miles, ecosystems range from foothill woodlands at about 500 ft elevation through montane chaparral and forests, and into alpine communities above 14,000 ft. The southern Sierra Nevada Region (SSN) is highly valued for its native biodiversity, recreational opportunities, and as a main source of water for California agriculture, energy generation, and domestic needs. The Region's assets benefit the people of California, the country and the world. The region is relatively unfragmented by development and its headwaters and middle elevation watersheds are almost

entirely administered for public benefits. The region is also the largest contiguous area within the Sierra Nevada best suited to the management of wildland fire for multiple resource benefits and protects the largest contiguous Wilderness area in California.

Increases in temperature and changes in snow hydrology have already been observed. There is growing recognition that global climate change will affect long-term management options for the conservation of the Region's resources. This part of California continues to attract new residents, rapidly expanding the region's wildland-urban interface. Air pollution is a severe and chronic problem in the Region, particular in the southern half where ozone levels regularly exceed EPA standards at mid-elevation locations. Fire management and other land use decisions during the early to middle 20th Century have severely altered the structure, composition, and fire regimes of selected plant communities in the SSN. Invasive non-native plants, animals and diseases have transformed some ecosystems by excluding native biodiversity and substantively altering ecosystem processes. All of these agents of change interact with one another, and affect ecosystems in ways requiring that land managers' responses be planned and executed at broad spatial and temporal scales.

Purpose and Need (Possible "Whereas" Statements)

These agents of change threaten to alter some key ecosystem functions of the southern Sierra Nevada, such as provision of clean air and water, biodiversity, maintenance of soil fertility, flood attenuation, and sustainable provision of amenities and commodities valued by humans.

Southern Sierra federal, state, tribal and local land managers and stakeholder organizations recognize that this combination of anthropogenic "change agents:"

- are interacting and amplifying impacts on biodiversity and key ecosystem functions;
- are likely to drive some valued ecosystem elements out of the region or to extinction;
- are challenging our views and traditional land management practices; and
- transcend ownership and administrative boundaries.

In addition, SSN land managers and stakeholders:

- have differing, often opposing mandates and values, and with the exception of fire management, conservation decisions and actions are relatively uncoordinated;
- have complementary expertise, capabilities, land bases, fund sources and more that, when added together through collaboration, can be "greater than the sum of the parts."
- recognize that collaboration at a regional scale is necessary to protect shared values from being adversely affected by these agents of change; and
- need to approach the challenge "head on" to create resilience, resistance, and in other ways adapt to the combined impacts of agents of change.

Mission Statement

Creating new capabilities and capacity for shared science-based learning and collaborative action requires an integrated regional approach that transcends jurisdictional boundaries. Therefore, to effectively manage the natural, cultural and ecosystem service resources across this landscape, the signatories to this conceptual proposal agree on the following mission statement.

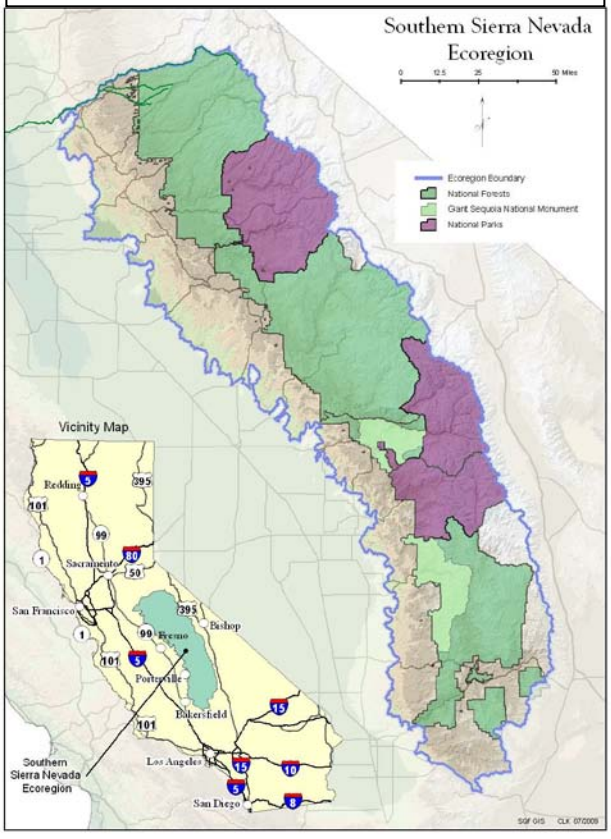
The mission of the Southern Sierra Conservation Cooperative is to leverage partners' resources and efforts to conserve the regional native biodiversity and key ecosystem functions within the southern Sierra Nevada ecoregion in the face of accelerated local and global agents of change.

Guiding Principles

To accomplish the Southern Sierra Conservation Cooperative (SCC) mission we agree on the following guiding principles:

1. Our capabilities are significantly enhanced by leveraging ideas, effort, and resources.
2. The Cooperative is a forum for dialogue between managers and scientists, and between agencies and organized interest groups.
3. We will be inclusive and flexible with our approach to maximize coordination with each other and other southern Sierra interests.
4. Our capacity to act effectively is the result of coordinated, cooperative action.

Figure 1. Geographic Area



Geographic Scope

The conservation cooperative area is generally defined by the administrative boundaries of Yosemite National Park and Stanislaus National Forest to the north, the crest of the Sierra Nevada mountain range to the east, the Tehachapi watershed to the south, and the boundaries of the NPS and USFS management units to the west (Fig. 1). This area includes multiple NPS, BLM and USFS management units focused on managing landscapes for sustainable ecosystem integrity and services, and various public uses. The biogeography, history and a clear need for a regional approach to these issues as partners is what functionally defines the proposed SSCC area of interest.

The geographic boundaries capture significant watersheds, which gives us confidence we can be successful in achieving the goals and objectives outlined in this agreement. The geographic scale is large enough to deal with real life cross-boundary issues (e.g. the federal agency units have a history of sharing cross-boundary fires), but (hopefully) not so large that collaborative efforts would be unduly compromised by our differences.

Goals and Objectives

To make progress, the partners recognize that the regional collaborative approach requires iterative, measurable actions to maintain partner interest and support. To frame the SSCC for immediate and long-term success, we agree to engage in the following goals and objectives throughout the remainder of 2010:

A. Create an Administrative Framework for the Cooperative Agreement

1) Develop a process for formalizing agreements with partners
2) Determine how to safely interact, create coordinated decision and action space, and metrics for evaluating success
3) Facilitate leadership and work assignments

B. Develop a roadmap with measurable milestones, and a process for coordinated partner involvement and resources management actions

C. Formally adopt (as appropriate) the June 2009 "Strategic Framework for Science in Support of Management in the Southern Sierra Ecoregion" (attached).

1) Add an element to the framework for evaluating costs, benefits and feasibility for potential alternative actions.

2) Implement (as appropriate) the Strategic Framework in C above through "initiatives"
   a. Collaboratively develop work plans for the four goals of the Strategic Framework

   b. Engage in relevant and time-sensitive **COLLABORATIVE INITIATIVES,** specifically:
      - Evaluate the utility of the Southern Sierra Partnership "Climate-adapted Conservation Plan" at a workshop on April 20-21, 2010. Incorporate useful information through an agreed upon framework and shared expectations.
      - Determine how to enable effective and efficient ***information sharing*** (see attached draft action plan)
      - Reevaluate ***fire management*** objectives across the geographic scope in light of accelerated climate change
      - Reevaluate and coordinate ***invasive plant programs*** and practices across the region in the context of accelerated climate change.
      - Create a means to conduct coordinated ***adaptive management experiments***

Proposed COLLABORATIVE INITIATIVES

Create an Information Clearinghouse for Shared Learning

Goal 4, Objective 1 in the Strategic Framework for Science document outlines at a basic level what needs to be accomplished. Our **GOAL** is to collaboratively develop a program of research, monitoring, information sharing, and public education to help inform a collective response to the planning, implementation, evaluation, and revision of resources management and other land management planning efforts in the Southern Sierra Ecoregion.

Broad Objectives:

- ✓ Coordinate thematic synthesis of priority resources management and science information relevant to the ecoregion;
- ✓ Secure the information technology we need and develop a management infrastructure to sustain;
- ✓ Regularly host a series of symposia and periodic thematic workshops to collaboratively address region-specific resources management and science information needs;
- ✓ Develop shared goals and for adaptive management response process to enable continuous, collaborative learning relative to resources management in the ecoregion; and
- ✓ Establish a credible performance progress evaluation strategy.

Near-term (2010) Action Objective:

- ✓ Establish an internet site to post information and enable sharing and editing of documents.
- ✓ Pilot test ripe data sharing opportunities and develop necessary agreements

Longer-term (2011-2012) Action Objectives:

- ✓ Establish a framework and start building the infrastructure for a sustainable data sharing and science information clearinghouse for targeted regional end users.
- ✓ Complete a "formal requirements analysis" to ensure effective design: identify goals, objectives; users/audience, primary uses, current and appropriate technology, costs, roles and responsibilities
- ✓ Seek USFWS sponsored Landscape Conservation Cooperative (LCC) Initiative support when the LCC is operational.

Reevaluate Fire Management Objectives across the SSCC Landscape

Goal: Develop the capacity to manage fire under a "new lens" and to revise objectives, tools and methods so that valued resources that are sensitive to climate change can be conserved at an appropriate scale.

Broad Objectives:

- ✓ Identify strategic placement for fire management treatments in time and space in context of climate change.
- ✓ Catalyze the development of region-wide fire management planning and implementation strategies to accomplish our goal.

Near-term (2010) Objectives:

- ✓ Support the creation of a Southern Sierra Fire Science Working Group to facilitate the integration of fire science and management for ecoregional-scale planning, implementation, and evaluation across administrative boundaries in the context of accelerated agents of change and multiple land-use priorities.

Longer-term (2011-2012) Measureable Objectives:
The federal partners will develop a framework and tools to evaluate and create realistic and flexible fire management objectives based on plausible future environmental conditions in the Southern Sierra Nevada Ecoregion. Specifically, federal partners who elect to participate in this effort, will:

1. Identify precisely ***where*** fire can be effectively used as a management tool if temperatures rise significantly and precipitation changes in time, form, place, duration, and amount.
2. Identify and map ***which*** natural and cultural resources are likely to be most vulnerable to the interacting effects of changing climate, fire regimes, and other agents of change.
3. Identify plausible scenarios about ***where*** biodiversity and ecological integrity are most likely to: a) remain stable without intervention, b) survive if current fire management objectives and prescriptions are applied; and c) suffer losses unless new treatment strategies are developed.
4. Identify ***what*** federal partner's fire management objectives and prescriptions (coping strategies) should be to enable the conservation of valued fire-dependent ecosystems and to protect fire-sensitive focal resources throughout the park.

Reevaluate and Coordinate Invasive Plant Programs and Practices

Goal: Facilitate the integration of invasive plant science and management for ecoregional-scale planning, implementation, and evaluation across administrative boundaries in the context of accelerated agents of change and multiple land-use priorities.

Near-term (2011) Action Objectives:

- ✓ Promote the creation of a Southern Sierra Invasive Plants Science Working Group (SSIPSWG) whose purpose is to accomplish the goal of this initiative.

Longer-term Objectives:

- ✓ TBD by the proposed SSIPSWG

Conduct Coordinated Adaptive Management Experiments

Goal: Facilitate adaptive management experiments for ecoregional-scale planning, implementation, and evaluation across administrative boundaries in the context of accelerated agents of change and multiple land-use priorities.

Broad Objectives:
Design and initiate coordinated adaptive management experiments to:

- ✓ determine appropriate fuels management practices for giant sequoia groves;
- ✓ sustain blue oak woodland recruitment and dispersal (e.g., test findings of TNC's Oak Distribution Climate Model);
- ✓ respond effectively to "catastrophic ecosystem events" such as a landscape level stand replacing fire or an insect or disease that affects key ecosystem components. Prepare experimental design that will be ready to put into place soon after sudden events; and
- ✓ facilitate integrated water flow and wetland, riparian, and meadow restoration planning and maintenance.

This Charter is founded by the following parties. EXAMPLES of how the signature page could appear. Will need formal review and approval. **Need to confirm who the founding parties are!**

State of California
Sierra Nevada Conservancy

_____
JIM BRANHAM (or Kim Carr?)
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Date:

United States Department of the Interior

USDOI NATIONAL PARK SERVICE
Sequoia/Kings Canyon National Parks

_____
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Park Superintendent
Date:

USDOI GEOLOGICAL SURVEY/
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United States Department of Agriculture

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Dr. Matthew Brooks
Research Ecologist
Date:

Not for Profit Organizations
The Nature Conservancy—California Office
California Audubon Society
Sierra Business Council
Sequoia Riverlands Trust
Tejon Ranch Conservancy

A Strategic Framework for Science in Support of Management in the Southern Sierra Nevada Ecoregion

A Collaboratively Developed Approach

June 10, 2009

Developed by:
The US Department of Interior National Park Service, Sequoia/Kings Canyon National Parks
The US Geological Survey, Western Ecological Research Center
The USDA Forest Service, Pacific Southwest Research Station
The USDA Forest Service, Sequoia National Forest/Giant Sequoia National Monument

Figure 1

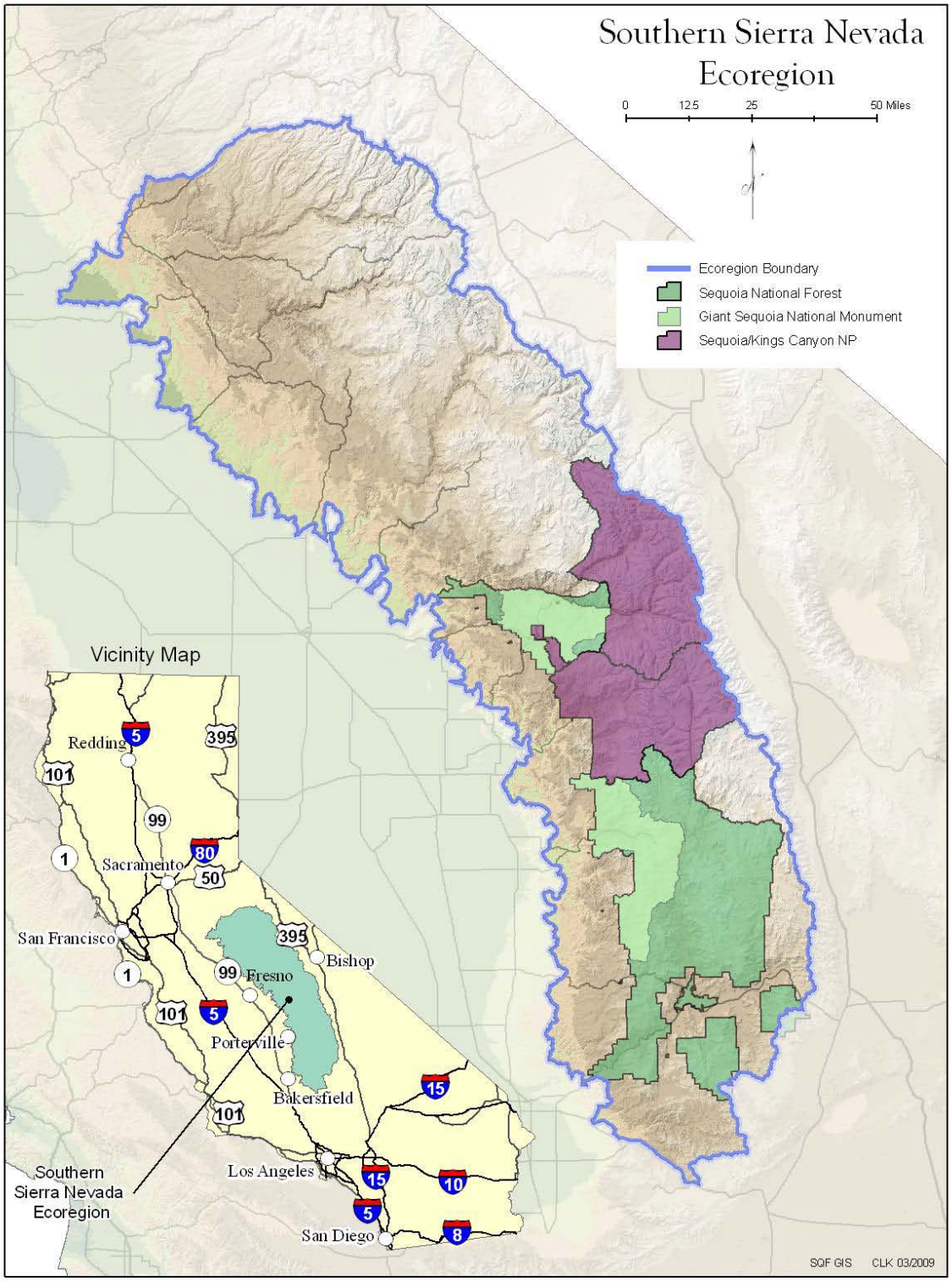
Southern Sierra Nevada Ecoregion
0
12.5
25
50 Miles
Ecoregion Boundary
Sequoia National Forest
Giant Sequoia National Monument
Sequoia/Kings Canyon NP
Vicinity Map
Redding
Sacramento
San Francisco
Fresno
Bishop
Porterville
Bakersfield
Los Angeles
San Diego
Southern Sierra Nevada Ecoregion
SQF GIS CLK 03/2009

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TABLE OF CONTENTS

Conclusions and Recommendations

This document is a strategic framework for management-directed scientific inquiry. It serves as a foundation for a comprehensive, coordinated approach for integrating science into regional land management activities. The framework's purpose is to guide the creation of a work plan. The development of the work plan is an iterative process that will evolve through collaborative learning.

To implement the strategic framework and the development of the work plan, we recommend a full time professional be dedicated – a person to integrate science and management and to ensure that this effort succeeds.

Whether or not a position is dedicated, we recommend the following framework elements as critical initial actions in this overall effort.

Focus on answering the following questions:

- Which ecosystem elements are important and time sensitive to track?
- Where on the landscape should actions be taken now?
- How does each agent of change affect important ecosystem elements?
- Which agents of change can be slowed and why?
- What tools and approaches further effective human response to known agents of change?

Take swift action to:

- Create a range of plausible future scenarios
- Create an information clearinghouse

In addition to the above, we need a process to engage scientists and managers that will result in a major transformation in thinking about public land management. Climatic change is unlike any other challenge yet encountered by public land managers. The effects of climatic change on resources will be strongly influenced by interactions with other agents of change. The way we manage landscapes will change radically. This situation demands novel thinking and creative management actions. We must avoid committing to a single path or solution and assuming that old ways will suffice. The process to transform thinking will take a substantial commitment of funds and time to achieve.

Introduction

The U.S. Department of the Interior National Park Service, Sequoia and Kings Canyon National Parks (NPS); U.S. Geological Survey, Western Ecological Research Center (USGS); the U.S. Department of Agriculture Forest Service, Pacific Southwest Research Station (PSW); and Sequoia National Forest/ Giant Sequoia National Monument (FS) have entered into a Memorandum of Understanding (MOU) to collaboratively develop a program of research, resources management, and public education to help inform our collective response to climatic change effects on ecosystems of the southern Sierra Nevada. Although our area of interest encompasses the west slope of the Sierra Nevada ecoregion from Yosemite National Park south to Tehachapi Creek (see Figure 1), the pilot area involves only the area of the MOU signatories. We intend to coordinate with other agencies and entities that are not formal signatories to the MOU but that are included in this geographical area.

Purpose

This Strategic Framework represents an early product of the joint agreement, and outlines the priority science information needs related to the southern Sierra Nevada region. The Framework has been developed strategically, and thus will act as a conceptual guide rather than a detailed prescription for specific science projects. It is meant to help scientists and managers plan, prioritize, fund, execute, and report the results of research aimed at addressing priority information needs relevant to the management of public lands in the face of an uncertain and unprecedented future. The Strategic Framework will lead to relevant and useful science products that help the broad community of policy and decision-makers, resource practitioners, scientists, and citizens to make sound decisions and take effective action in varied and uncertain situations.

Background

The southern Sierra Nevada ecoregion is of great importance regionally, nationally, and globally, not only for its abundant recreational opportunities, but as the main source of water for California's thriving agriculture, energy production, and domestic water needs. The ecosystems of the southern Sierra Nevada ecoregion provide an array of other ecosystem services to the people of California, the country, and the world. The southern Sierra Nevada ecoregion is relatively intact, and the headwaters and middle watersheds are almost entirely administered for public benefits. However, landscape changes, including the effects of global climatic change, shifting fire regimes, patterns of human land use, and other ecosystem agents of change have already affected the integrity of this ecoregion's natural, cultural, and socio-economic resources and assets.

Global climatic change has already caused significant regional warming and consequent changes in snow hydrology that, in turn, may affect the long-term sustainability of forest, monument, and park resources. Other major drivers of changes in ecosystem structure and function include habitat fragmentation, encroaching urbanization, shifting fire regimes, invasive species, and increasing air pollution, among others. All of these agents of change interact with one another, and affect ecosystems at broad spatial scales, usually requiring that responses also be planned and executed at broad spatial and temporal scales.

Guiding Principles

The following Guiding Principles helped provide a foundation for the Strategic Framework's creation, and may further help guide its implementation.

- Climatic change cannot be addressed in isolation. The effects of climatic change on resources will be strongly influenced by interactions with other agents of change. Therefore this document focuses on all agents of change, even though climatic change is the overarching theme.

- Resource management decisions must be based on sound science, therefore this Strategic Framework focuses on science relevant to managers. Implementation of this Framework requires continuous, iterative collaboration between scientists and managers.

- Humans are both agents of change and the recipients of the outcomes of those changes. These changes affect us in the short and long term: socially, economically and culturally. Because of this inextricable link, this Framework provides a blueprint for collective action.

Strategic Framework Approach and Structure

Members of the science and land management communities and the public met over two days in September 2008 at the Southern Sierra Science Symposium. The work of the second day resulted in a series of questions related to a broad spectrum of information needs. These questions provided a foundation for the development of the Strategic Framework. A synthesis of the symposium results is included at the end of this document.

A challenge in developing this Strategic Framework was deciding on an organizational structure that would be both useful and transparent to all interested parties. We considered structures based on agents of change, on scientific disciplines, on science activities, and others. We finally chose to organize around the broad classes of information that managers need to make decisions and act. We felt this best allowed us to maintain a sharp focus on the questions most relevant to managers, policy makers, and the public. Specifically, several broad questions emerged regarding southern Sierra Nevada ecosystems and their management:

• First, what is happening, why is it happening, and what does it mean? This question looks at the past and the present. For example, has a particular species been declining? If so, why? And if so, is the decline great enough to be cause for concern? Informed decision-making and management actions are impossible without this foundational information.

• Second, what is a range of plausible futures we might face? This question complements the preceding question by looking to the future. Again, informed decision-making and management actions are impossible without this foundational information

• Third, what can we do about it? This question is about action. If the foundational information answering the preceding two questions indicates that undesirable changes are happening or are likely to happen, what options do we have for adaptation or slowing agents of change?

• Fourth, how can relevant information be made accessible to all who desire it? Answers to the preceding three questions, no matter how sophisticated and potentially useful, are irrelevant to society if the information is not validated and made readily available in useful forms.

These questions drove the formulation of the highest level of the Framework's structure. To keep the Framework strategic, it has just four nested levels of structure. First, from the four major question areas above, broad goal statements were written that express the desired result for each. Second, each goal is subdivided into objectives. Third, under objectives come tasks, which are expanded at the fourth and most detailed level by a set of questions. These questions are meant to help guide implementation, but are not intended to be exhaustive.

For example, the first question "what is happening, why is it happening, and what does it mean?" is represented by the information needs resulting from detection, attribution, and interpretation. The goal for this question is: "We detect and describe ecosystem changes across a range of spatial and temporal scales, can understand why change is occurring, and can interpret its significance."

The goals here have been intentionally written to describe the *outcome* sought as opposed to the *action* that will be taken, to better enable evaluation of progress. That is, plenty of detection, attribution, and interpretation could be done, but the important issue is whether or not that effort has fostered knowledge of why change is occurring, what it means, and whether or not it is significant.

The objectives under each goal express desired results that contribute to the larger goal. For example, under the goal "We detect and describe ecosystem changes across a range of spatial and temporal scales, can understand why change is occurring, and can interpret its significance," there are objectives addressing status and trends, cause and effect relationships, and context for interpretation. The objective for status and trends is "We know the status of ecosystem elements and what has changed since humans began to significantly affect Sierra Nevada resources."

Under objectives are tasks, which address the major areas of work to be accomplished to achieve each objective. For example, a task under status and trends is "develop status and trends information." The tasks are then expanded by sets of questions from which research and other projects can be developed. For example, under "develop status and trends information" falls the question "What ecosystem elements are important and time sensitive to track?"

The approach and four nested structural levels of the Strategic Framework are intended to provide useful organization to complex topics, and to give strategic guidance to the science and land management community for a coordinated science effort in the southern Sierra Nevada.

Goal 1: Detection, Attribution and Interpretation

We detect and describe ecosystem changes across a range of spatial and temporal scales, can understand why change is occurring, and can interpret its significance.

Objective 1: Status and Trends

We know the status of ecosystem elements and processes and what has changed since humans began to significantly affect Sierra Nevada ecosystems.

Assumption: Knowledge of past and present Southern Sierra Nevada geophysical and biotic diversity, ecosystem processes, and human interactions with these diverse resources can provide a critical baseline for evaluating current ecosystem integrity and function, as well as historic change over time, and can therefore prepare us for an uncertain future.

Task 1: Develop status and trends information

- What ecosystem elements are important and time sensitive to track?
- What fundamental information do we need to be prepared for the future and why is the identified information important?
- What are the descriptions, status, and trends of fundamental and influential elements in the region (e.g. water, soils, and biota)?
- What is established in the literature and what is uncertain about recent status and trends of regional ecosystem elements?

Task 2: Identify agents of change

- Are climatic change, altered fire regimes, land use, non-native invasive species, and contaminants the most significant agents of change affecting our region?
- Are there other significant agents of change?

Task 3: Identify sensitive and socially valued resources

- Who are the stakeholders and what do they value?
- What are the bases for these values, e.g. ecosystems services like water?
- How are priority resources identified?
- Are the sensitive and valued resources in an acceptable condition?

Objective 2: Understand Key Cause and Effect Relationships

We understand and can explain how particular agents of change drive changes in ecologically significant and/or socially valued resources.

Assumption: To take appropriate management action, we must be able to reliably demonstrate that the changes we observe are attributable to one or more agents of change that threaten our valued resources.

Task 1. Understand how social forces affect agents of change

- What are the demographic forces?
- What are the political forces?
- What are the economic forces?

- What are the cultural forces?
- How do these interact?
- Where are they having the greatest impact and why?

Task 2: Understand relative contributions of and interactions among the agents of change

- How does each agent of change affect ecosystem elements?
- How do cumulative impacts of the agents of change affect the ecosystem elements?
- How do the agents of change interact?
- What makes an ecosystem vulnerable, resistant, or resilient to agents of change?
- What makes human communities willing to adapt, and capable of adapting, to agents of change?

Objective 3: Context for Interpreting Findings

We understand how the rates and magnitudes of observed changes compare both to past changes (historical range of variability) and to desired conditions.

Assumption: Understanding the relative significance of observed changes is prerequisite to deciding what, if any, actions can and should be justified.

Task 1: Understand how observed changes compare to past changes

- How did regional conditions change over long periods before Euroamerican settlement?
- How do recent trends in key agents of change compare to pre-Euroamerican trends?
- How do recent trends in ecosystem structure, composition, and function compare to pre-Euroamerican trends?

Task 2: Understand how observed changes compare to desired conditions

- How do current trends and conditions compare to legal mandates?
- How do current trends and conditions compare to policy?
- How do current trends and conditions compare with stakeholder values?

Goal 2: Forecast Future Conditions

We will be able to anticipate possible futures to help us develop feasible responses.

Objective 1: Models describe key relationships

We have the models needed to help explain relationships among forces driving ecosystems and their value and services.

Assumption: Scientific models help simplify and explain relationships.

Task 1: Develop models

- What models are already available?
- What relationships are not understood?
- What new models do we need?
- What should be the prioritization and sequence of their development?
- How do we validate the models?
- What needs to be parameterized?

Objective 2: Forecasts

We have forecasts of possible futures resulting from a range of environmental, socio-political, and management conditions.

Assumption: Forecasts of future conditions help managers and policy makers proactively consider the ramifications of alternative decisions.

Task 1: Run models

- What is a plausible range of future socio-political conditions?
- What is a plausible range of future conditions of agents of change, e.g. how bad will air pollution be in 2050?
- What is a plausible range of future ecosystem responses to these conditions?

Task 2: Interpret model results

- What are the possible implications for ecosystem management?
- What resources are likely to be most sensitive to agents of change?
- What resources are most vulnerable to threshold changes?
- What are the consequences of intervening in ecosystem processes to preserve biodiversity or desirable elements?

Objective 3: Scenarios

We have scenarios representing a range of possible and plausible futures.

Assumption: Scenarios are useful narratives for a range of plausible futures that form the basis for scenario planning, which is a well-developed and widely-accepted tool for coping with uncertainty.

Task 1: Create a range of plausible future scenarios

- What are the questions we want to answer?
- What are the information requirements?
- What is the best way to create plausible scenarios?

Task 2: Understand scenario utility

- What do the scenario results suggest?
- How much confidence in these results is warranted?

Goal 3: Tools and Actions

We have the tools required to take effective and efficient action.

Objective 1: Adaptation

We have the tools and action options required to effectively adapt to change.

Assumption: We have the ability to adjust to impending unprecedented change.

Task 1: Identify the current capacity for adaptation

- What tools and approaches currently further *ecosystem* resilience, resistance, realignment, and response to known agents of change?
- What tools and approaches currently further *human* resilience, resistance, realignment, and response to known agents of change?

Task 2: Develop new capability to adapt

- What tools need to be developed to evaluate *ecosystem* resilience, resistance, realignment, and response to known agents of change under varied and uncertain conditions?
- What tools need to be developed to evaluate *human* resilience, resistance, realignment, and response to known agents of change under varied and uncertain conditions?
- How can we strategically identify parts of the landscape for different management actions?
- Where on the landscape should actions be taken now?
- What tools need to be developed to support triage?
- How do human communities develop the willingness and capacity to adapt to agents of change?

Objective 2: Curb undesired agents of change

We have the tools and action options required to help slow the rate of change.

Assumption: Society has the ability to affect agents of change.

Task 1: Identify the current capacity for slowing agents of change

- Which agents of change can be slowed?
- How can these agents of change be slowed?
- What tools exists to slow them?

Task 2: Develop new capability

- What information and tools need to be developed to develop capacity?
- Which management action alternatives are feasible?

Objective 3: Measure Success

Actions are evaluated to determine the degree of their success.

Assumption: We need to evaluate the success of actions to validate selected goals, objectives, assumptions, and actions and to be accountable resource stewards.

Task1: Understand the consequences of action (including no action)

- How can science improve accountability in monitoring management actions?
- What are the positive/negative, acceptable/unacceptable, cost effective/not-cost effective risks of management actions to increase ecological and human resilience to a broad range of possible futures?
- How do we know that we are being effective?

Task 2: Assess adaptation actions

- What prognostic tools exist or need to be developed to judge the probability of success?
- What diagnostic tools exist or need to be developed to measure success?
- What agency mandates or directives are not feasible?
- How do managers identify and define important management thresholds including when to start, stop, and expand management activities?

Goal 4: Information Management and Delivery

We have easy access to the growing body of information and effective ways of disseminating that information to the public, resource managers, and the scientific community.

Objective 1: Clearinghouse

A place or process will be established for the gathering, storage, and dissemination of high quality information.

Assumption: A location (physical or virtual) for readily accessible and credible information is essential.

Task 1: Select the information

- What should be the scope of the collection?
- What studies, inventories, and monitoring information, etc. already exist and where are they currently located?
- What existing data, reports, and publications of value should be digitized?
- How do we select which of these to make accessible?
- How will new information be vetted to insure its integrity, quality and transparency?

Task 2: Manage the information

- How can this information be made readily and broadly accessible?
- How will information be accessioned and catalogued?
- How should this information be served?
- How will sensitive information be secured?
- Who will be responsible for creating and maintaining the clearinghouse?

Objective 2: Effective use of information

Effective and innovative ways will be employed to disseminate, utilize, and monitor information that has been gathered to reach targeted audiences.

Assumption: Information needs and the understanding of that information varies among and between the various stakeholders and stakeholder groups.

Task 1: Identify the information needs of target audiences

- Within the target audiences, what specific groups and individuals are we trying to reach and for what purpose?
- What specific types of information do these groups and individuals need?
- How do these different needs affect the Clearinghouse?

Glossary

The Strategic Framework development team compiled the following definitions of key terms to ensure that they were used consistently and clearly throughout this document.

Adaptation – Management of ecosystems and human communities to ameliorate the undesired effects of agents of change.

Agents of change – The Sierra Nevada Ecosystem Project (1996) identified five regional systemic agents of change: rapid climatic change, altered fire regimes, invasive species, habitat fragmentation, and contaminants. In addition to these, we recognize two other important agents of change that must be understood: historic and contemporary recreational activities and land use. Sometimes agents of change are referred to as stressors.

Clearinghouse – A centrally located place, virtual or physical, where information is collected and disseminated.

Cultural resource – An aspect of a cultural system that is valued by or significantly representative of a culture, or that contains significant information about a culture. A cultural resource may be a tangible entity or a cultural practice. (NPS Management Policies, 2006)

Decision-maker – The managerial-level employee who has been delegated authority to make decisions or to otherwise take an action that would affect [public land] resources or values (NPS Management Policies, 2006). Here refers to resource managers, policy makers, and line officers.

Ecosystem – A system formed by the interaction of a community of organisms with their physical and biological environment, considered as a unit. (NPS Management Policies, 2006)

Ecosystem element – A living or non-living physical object in any ecosystem. Elements scale from individual organisms and single rocks or water bodies to species-populations and entire drainages or landscapes. Ecosystem elements are the "nouns" in the system in contrast with ecosystem processes, the "verbs."

Forecast – A projection of future conditions based on a model that is incomplete, poorly validated, or otherwise known or suspected to be imperfect. Because our understanding of ecosystems is imperfect, ecosystem models give us forecasts, not predictions.

Management intervention – A management action designed to intentionally alter ecosystem conditions.

Mitigation – [With respect to global warming] An action taken to reduce the rate of increase of greenhouse gases in the atmosphere to slow the rate of global warming. Mitigation may be in the form of reducing releases of greenhouse gases, or of sequestering those already in the atmosphere.

Natural resource – A living or non-living physical object that is derived from the natural world, such as plants, animals, soil, water and air.

Realignment – Management actions that adjust ecosystems to the reality of large, rapid, and uncontrollable environmental changes, rather than trying to restore and maintain past ecosystem conditions.

Resilience – The ability to recover from changes induced by a stress.

Resistance – The ability to resist or absorb stresses without changing greatly.

Resource – Any physical or virtual entity of limited availability. In this context, only natural and cultural resources are considered. (See Natural Resource and Cultural Resource.)

Resource practitioners (specialists) – Those who advise decision-makers and actively manage resources for accepted purposes and needs.

Response – Management actions meant to facilitate transitions of ecosystems from current to new conditions.

Scenario – A plausible and internally consistent narrative about a possible future. Scenarios may or may not incorporate model forecasts. A very simple example of a scenario: "In 2050 the Sierra Nevada is warmer and wetter, but snow is melting much earlier; wildfires are somewhat larger and harder to control; recreational visitation has more than doubled; and a previously unknown pathogen is killing giant sequoias at 10 times the 'normal' rate."

Scenario planning – Scenario planning is a strategic planning process in which managers invent and then consider, in depth, several varied scenarios of plausible futures with the objective of revealing potential surprises and producing unexpected leaps of understanding. These scenarios provide a tool for transforming the perceptions of a management team. The point is to make strategic decisions that will be sound for a range of plausible futures, and scenario planning makes this possible by considering choices in the context of possible futures.

Southern Sierra Nevada Ecoregion – A broad geographic area and the associated ecosystem types located south of the Tuolumne watershed to the Tehachapi Creek, to the east of the 450 foot contour and west of the Sierra Nevada crest.

Stakeholders – Any individual or group interested in all or parts of a particular project, landscape, or resource.

Stressor – See Agents of Change.

Target audience – A group of four broad categories of people consisting of decision makers, resource specialists, scientists, and the public.

Tool – A tool is a device or entity used to accomplish a task or facilitate more effective action; it serves as a means to an end.